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A Brazilian Sorghum Rust Caused by *Sphaerophragmium sorghi* n. sp.[1])

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With plates 62 (1)–63(2)

Field observations made by the first author, at the Agricultural Experiment Station of Caruarú, Pernambuco, Brazil, in 1959, called his attention to a very inconspicuous rust incidence on *Sorghum halepense* (L.) Pers. panicles.

The *sorghum* plantation near to be harvested, showed however about 60% of their panicles affected by this disease. The weather conditions were extremely favourable for rusts development, being the temperature ranging between 16–20°C., the nebulosity around 75 to 85% until 10 o'clock in the morning. The relative coefficient of air humidity was of 85 to 90% daily, during many days.

Due to this high degree of humidity, practically every panicles in the *sorghum* culture had "sooty molds" of *Phaeoxyphium*, and in many cases mixed with several Imperfect Fungi as *Alternaria* and *Cladosporium* besides the rust.

However, the culms and the leaves of *sorghum* were free from fungus infections, some of them with purple splotches due to a bacterial disease.

The rust was limited to the *sorghum* spikelets, in the panicles, producing malformations in the form of small pustules, causing the cracking of the tegument; hundreds of spikelets in the diseased panicles were damaged by tegument fissures caused by the rust, while many others were broken.

A representative material collected and brought to the Laboratory of Imur indicated after studies the presence of one unknown species of *Sphaerophragmium* characterised chiefely by irregularly distributed telia and uredia on the spikelets epidermis, as dark brown points. The telia and uredia (185–650 μ in diam.) developed into the same sorus, are subepidermal in their origin, with a pseudoparenchymatic and stromatic center formed by polygonal cells of 6,5–16×5,5–11 μ; they soon become irrumpent and irregularly dehiscent, liberating a powdery and thick mass of blackish brown spores which becomes brown red later on, when the spores are dessicated (Fig. 5).

[1]) Instituto de Micologia – Universidade do Recife – Publicação n° 204.

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The spores of the pulverulent mass over the rust pustules, are predominant in probasidia or teliospores forms which are composed by 9 to 15 cells supported by a cylindrical, hyaline or yellowish, septate stipe or pedicel of 9–35×4,5–6,5 μ (Fig. 4).

These probasidia are really dictyospores, being subglobose to pyriform, 15–40×13,5–27 μ with dark cell walls brown-redish ornated by several tubercles, their form being hemisphaeric, conoidal or truncate, very dark brown, 1,5–3 μ height giving an interesting appearance to these spores; episporium about 1,5 μ thick (Fig. 6).

The germinative pores have not been observed. Neither for the probasidia nor for the urediospores.

Under histological cuts of a sorus, can be easily distinguished the mixed occurence of telia and uredia. The urediospores however are quite reduced in number, and sometimes, only few of them can be seen in one preparation, eventhough they must be considered of systematic value. They are obovoidal, ellipsoidal or pyriform, unicellular, brown, having a thin episporium, spinescent to warted, 15–25×9,5–19 μ. The urediospores are separated in the uredia by means of capitate or clavate paraphyses which are 2–3 septate, numerous, and 6,5–11 μ in diam. at the enlarged appex (Figs. 2 and 3).

Not very far from the sorus, in the external surface of the spikelets tegument, as well as in their inner surface, and so in an amphigenous, condition black points can be noted under the stereomicroscope, constituted by the pycnia (Fig. 1). The pycnia are immerse-erumpent, scattered, or densely aggregate, conoid to subglobose (Fig. 7), brownish-black, 115–180 μ diam., 85–160 μ in height, uni or bilocular, ostiolate, 13,5–16 μ diam., membranous, the walls being 13,5–16 μ thick formed by polygonal cells of 6,5–11×2,5–3 μ; the hymenium is simple or generally disposed in the loculum, with many sterile and fertile filamentous as hyaline hyphae, 12 to 20 μ long. The pycnidiospores are numerous, bacillar to ellipsoid, continuous, hyaline, 4–5,5×1–2 μ.

Aecia unknown.

Loking up the systematic position of this fungus we have not been able to find among the known species of *Pucciniaceae* one to be identical with this one.

The fungus now found on *Sorghum* by the characteristics of its teliospores is quite related with the genus *Anthomyces* Diet. being different, meanwhile, in the lacking of smooth teliospores, with vertical septa. The best genus to include it is, in our opinion the genus *Sphaerophragmium* Magn. very well established for its parasitic species on *Leguminosae*, *Anonaceae*, to be found chiefly in the tropical areas of the world. In this genus, the occurrence of pycnia is rare, but this

is not a suficient character to carry our fungus in an other genus. Identical considerations may be offered in relation with the host family, since the delimitation of distribution of fungi genera may be subordinated to various factors.

Through comparison of our species with the *Sphaerophragmium* species previously described, we note that it is quite distinct for its telia, uredia and pycnia occure together on the spikelets of *Sorghum*. The teliospores are however suggestive those of *Sphaerophragmium boanense* Cummins by their tuberculate ornamentation, but distinct, because the later fungus has teliospores composed by 5 to 7 cells only, (see Cummins, G.B. in Mycologia, XXXII: 359–375, il. 1940), lacking on uredia and pycnia production. The measures of the teliospores of our fungus are near those of *S. artabotrydis* Doidge but Doidge's species possess quadricellular teliospores (see Doidge, E.M. in Bothalia, p. 232, 1941).

The other species, discussed by Viennot-Bourgin (see Uredinales d'Afrique, in Uredineana Encyl. Mycolog. vol. IV, 203–211, 1953, and vol. V: 227, 228, 1958), being equally discrepant. We propose to describe our fungus as a new species, under the designation of *Sphaerophragmium sorghi* Bat. & Bez. with the following diagnosis:

Sori subepidermali in cariopsis tegumenti, minuti, singuli, 185–650 μ diam. et 114–190 μ alt., sparsi vel confluentes, obscuro-brunnei, uredosporis et teleutosporis mixti. Uredosporae rarae, obovoideae, ellipsoideae vel pyriformes, continuae, brunneae, 15–25×9,5–19 μ, spinescentes vel verrucosae; porae germ. obscurae; paraphyses periphericae, 2–3-septatae, capitatae vel clavatae, 6,5×11 μ in apicali diam., brunneae, cum membrana crassa. Teleutosporae subglobosae vel pyriformes, 9–15-cellulares, ad septa non constrictae, cum ambitu rotundo-quadratico, brunneo-rubescentes, superficies habentes tuberculis hemisphericis conicis vel trauncatis, brunneis obsitas, 1,5–3 μ alt.; porae germ. obscurae; episporium 1,5 μ cr.; pedicellum cylindraceum, hyalinum vel flavideo-coloratum, septatum, 9–35×4,5–6,5 μ. Pycnia sparsa vel dense aggregata, immerso-erumpentia, conoidea vel subglobosa, atro-brunnea, 115–180 μ diam., 85–160 μ alt., uni vel bilocularia, cum ostiolo pertuso, 13,5–16 μ diam. et parietibus membranosis, 13,5–16 μ cr., ex cellulis polygonalibus, 6,5–11×2,5–3 μ efformatis; hymenium simplex vel in tota cavitate fertile, cum hyphis fertilibus atque filiformibus, 12–20 μ long. Pycnidiosporae numerosae, bacillares vel ellipsoideae, continuae, hyalinae, 4–5,5×1–2 μ; Aecia non visa.

In spicis *Sorghi halepensis*. Typus, Imur, 17122. Leg. A. Chaves Batista, 7/9/959.

SUMÁRIO

Uma nova ferrugem de *Sorghum halepense* (L.) PERS. foi constatada, pelo primeiro Autor, na Estação Experimental de Agricultura, de Caruaru, em Pernambuco, 1959. Embora prevalecessem, então, condições climáticas bastantes vantajosas para uma intensa manifestação dessa doença, ela incidia sòmente sôbre panículas, não afetando o colmo e as folhas de sorgo, que se mostravam, no entanto, pintalgadas de vermelho-marron, devido a uma bacteriose. Próxima à colheita, a cultura de sorgo oferecia 60% de suas panículas atacadas pela ferrugem em aprêço, e, pràticamente, tôdas as panículas do cultivo se achavam atacadas por fumagina do gênero *Phaeoxyphium*, além de vários outros Fungos Imperfeitos, destacadamente do gênero *Alternaria*.

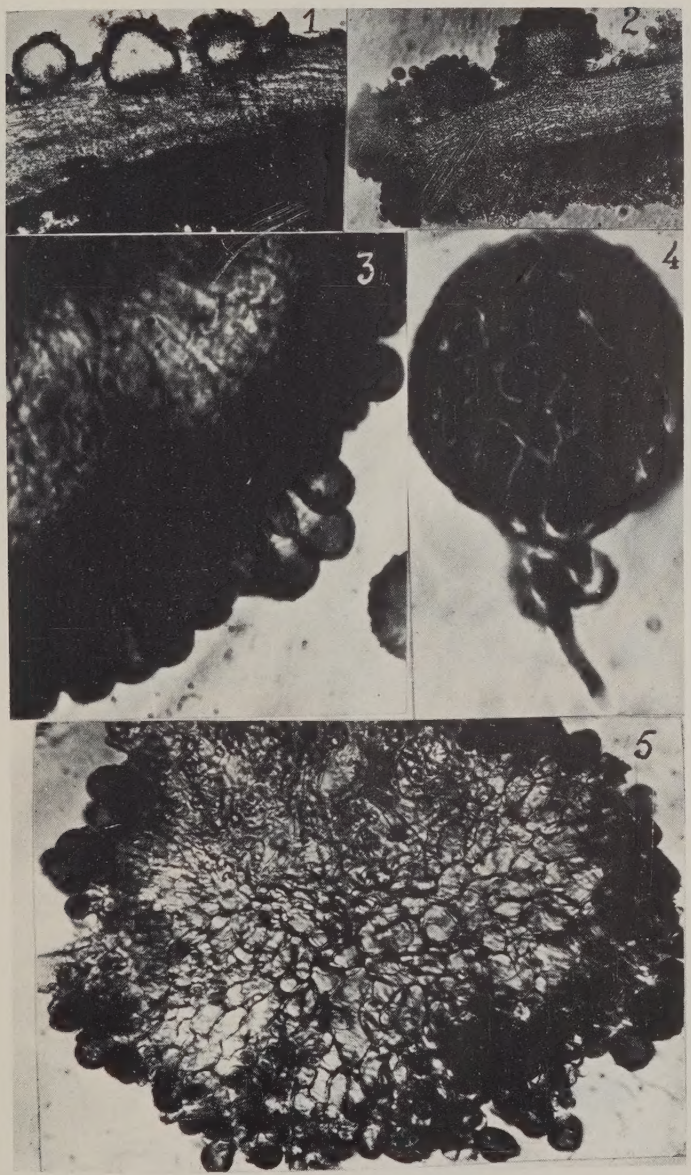
Estudada no Laboratório, verificamos que essa ferrugem é causada por uma nova espécies de *Sphaerophragmium*, designada como *S. sorghi* BAT. & BEZ. n.sp., a qual é descrita e acompanhada de sua diagnose latina.

Interessa focalizar que essa parece ser a primeira vez que uma ferrugem do gênero *Sphaerophragmium* é assinalada sôbre *Gramineae*, pois, até aqui, êsse gênero era bem característico das famílias *Leguminosae* e *Anonaceae*.

Agradecimento: Os AA. expressam ao Director da Estação Experimental de Agricultura, de Caruaru, os seus agradecimentos pelas atenções que lhes foram dispensadas.

EXPLANATION OF THE PLATES
SPHAEROPHRAGMIUM SORGHI BAT. & BEZ. n.sp.

Fig.: 1 – Pycnia through a longitudinal section of the host tissue.
Fig.: 2 – Longitudinal section of uredia and telia.
Fig.: 3 – Paraphyses and urediospores.
Fig.: 4 – Teliospores.
Fig.: 5 – Frontal view of an opened sorum.
Fig.: 6 – a) Teliospores not free yet. Telia. b) Stromata. c) Host tissue. d) Paraphyses. e) Urediospore. f) Teliospores.
Fig.: 7 – Pycnium.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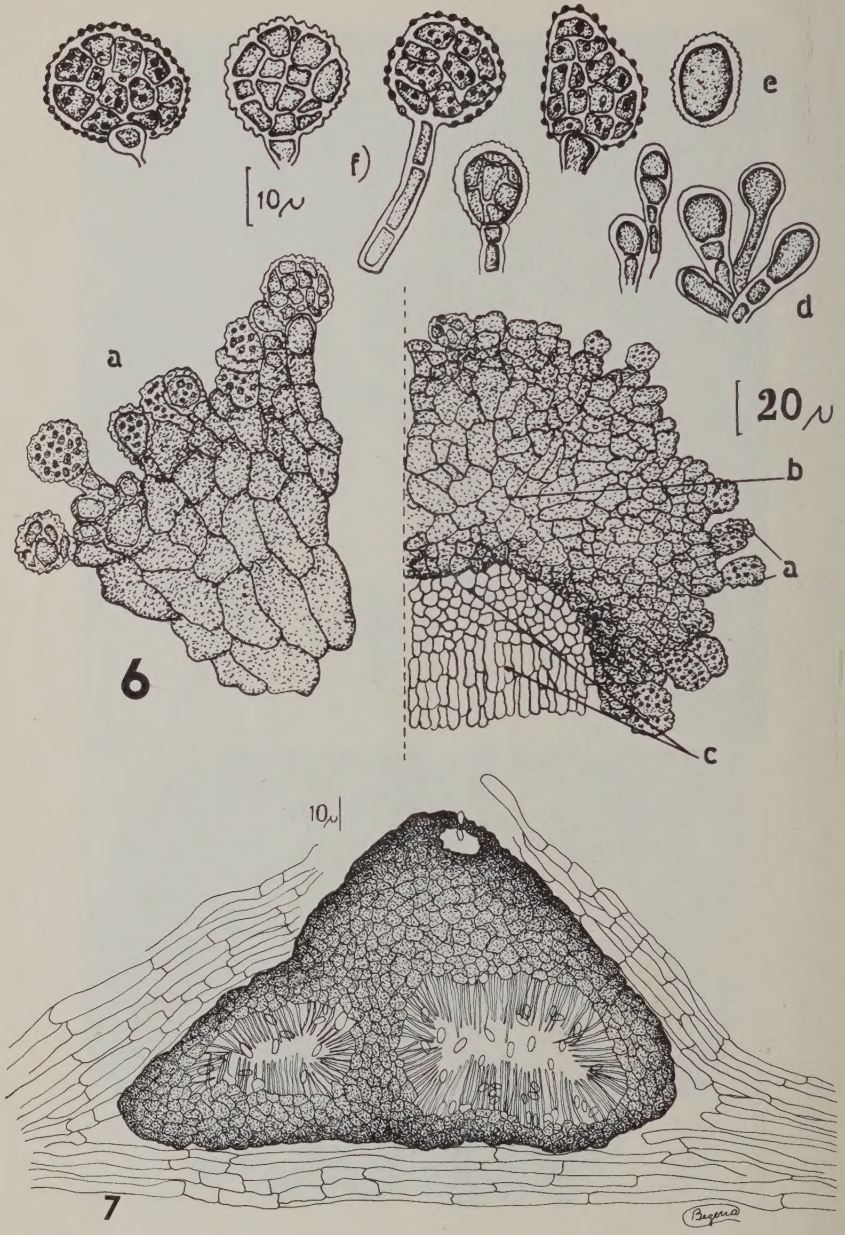
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